



The impact of regional climate change on malaria risk due to greenhouse forcing and land-use changes in tropical Africa

Author(s): Ermert V, Fink AH, Morse AP, Paeth H
Year: 2012
Journal: Environmental Health Perspectives. 120 (1): 77-84

Abstract:

BACKGROUND: Climate change will probably alter the spread and transmission intensity of malaria in Africa. **OBJECTIVES:** In this study, we assessed potential changes in the malaria transmission via an integrated weather-disease model. **METHODS:** We simulated mosquito biting rates using the Liverpool Malaria Model (LMM). The input data for the LMM were bias-corrected temperature and precipitation data from the regional model (REMO) on a 0.5 degrees latitude-longitude grid. A *Plasmodium falciparum* infection model expands the LMM simulations to incorporate information on the infection rate among children. Malaria projections were carried out with this integrated weather-disease model for 2001 to 2050 according to two climate scenarios that include the effect of anthropogenic land-use and land-cover changes on climate. **RESULTS:** Model-based estimates for the present climate (1960 to 2000) are consistent with observed data for the spread of malaria in Africa. In the model domain, the regions where malaria is epidemic are located in the Sahel as well as in various highland territories. A decreased spread of malaria over most parts of tropical Africa is projected because of simulated increased surface temperatures and a significant reduction in annual rainfall. However, the likelihood of malaria epidemics is projected to increase in the southern part of the Sahel. In most of East Africa, the intensity of malaria transmission is expected to increase. Projections indicate that highland areas that were formerly unsuitable for malaria will become epidemic, whereas in the lower-altitude regions of the East African highlands, epidemic risk will decrease. **CONCLUSIONS:** We project that climate changes driven by greenhouse-gas and land-use changes will significantly affect the spread of malaria in tropical Africa well before 2050. The geographic distribution of areas where malaria is epidemic might have to be significantly altered in the coming decades.

Source: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3261943>

Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Special Report on Emissions Scenarios (SRES)

Special Report on Emissions Scenarios (SRES) Scenario: SRES A1

Exposure :

weather or climate related pathway by which climate change affects health

Climate Change and Human Health Literature Portal

Ecosystem Changes, Precipitation, Temperature, Unspecified Exposure

Temperature: Fluctuations

Geographic Feature: ☒

resource focuses on specific type of geography

Tropical

Geographic Location: ☒

resource focuses on specific location

Non-United States

Non-United States: Africa

African Region/Country: African Region

Other African Region: sahel

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: Malaria

Mitigation/Adaptation: ☒

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: ☒

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Population of Concern: A focus of content

Population of Concern: ☒

populations at particular risk or vulnerability to climate change impacts

Children

Resource Type: ☒

format or standard characteristic of resource

Research Article

Timescale: ☒

Climate Change and Human Health Literature Portal

time period studied

Medium-Term (10-50 years)

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content